REMARKS

The Office Action of December 10, 2001 has been carefully considered. Reconsideration of this application, as amended, is respectfully requested. Claims 1-20 are pending in this application. Of these, claims 1 and 15 are independent claims.

1. Response to Rejection Under 35 USC 103

The Office Action, in section 2, beginning on page 2, rejects claims 1-20 under 35 USC 103(a) as being anticipated by the publication by Satoshi Konishi and Hiroyuki Fujita, entitled "A Conveyance System Using Air Flow Based on the Concept of Distributed Micro Motion Systems", published in the Journal of Microelectromechanical Systems, Volume 3., No. 2, pages 54-58, June 1994 (hereinafter referred to as "Konishi") in view of Harada et al., U.S. Patent No. 5,553,003 (hereinafter referred to as "Harada").

In response thereto, Applicants amend claims 1-3 and 7-20 to more fully set forth and claim what is believed to be Applicants' invention. Support for these amendments is set forth in part in Figure 6 and accompanying description in the first through the sixth paragraphs of section B of the specification entitled "Distributed Control With Global Constraints".

Konishi discloses a microactuator array for a planar conveyance system. More specifically, in the first paragraph of the introduction on page 54, column 1, Konishi "proposes the concept of distributed micro motions systems (DMMS)" as illustrated in Figure 1. This cited paragraph of Konishi further discloses that "the ultimate form of DMMS is expected to consist of many smart modules which have microactuators, microsensors, and controllers."

Harada discloses a control system that includes a supervising subsystem for supervising a plurality of subsystems that are structurally configured as shown in Figures 1 and 2. Figure 3 represents the process flow operation between the supervising subsystem and the plurality of subsystems, the details of which are described in column 4, lines 1-25.

Unlike Applicants' claimed invention which concerns an improved control system

for moving an object on a transport assembly, Harada's disclosure concerns a distributed control system for power distribution. Consequently Harada in combination with Konishi fails to appreciate the problem solved by Applicants' invention. Applicants' observed that cross-coupling of output between actuators may occur because of the proximity and high-density in which actuators are placed on the transport assembly. Cross-coupling may result in, for example, the output of two air jet actuators cumulatively applying a force that is different from the sum of the forces applied independently.

In accordance with the claimed invention, control agents are organized in local neighborhoods of control agents to minimize such cross-coupling effects. The control agents that belong to each of the local neighborhoods are coupled to sensors and actuators that are located physically proximate to each other on the transport assembly. Thus Applicants respectfully traverse the rejection of amended independent claims 1 and 15 and submit that Konishi in combination with Harada neither suggests nor discloses Applicants claimed invention set forth in amended independent claims 1 and 15.

More specifically, Konishi taken singly or in combination with Harada do not disclose or suggest a transport assembly and method of control therefor in which computational agents are grouped into a plurality of local neighborhoods, where: (a) the computational agents in each local neighborhood are coupled to sensors and actuators that are located physically proximate to each other on the transport assembly; and (b) the computational agents in each local neighborhood are communicatively coupled to each other for directly communicating their desired actuator response.

Furthermore, Konishi taken singly or in combination with Harada do not disclose or suggest as claimed by Applicants that each computational unit use (i) the global constraints delivered by a global controller, (ii) the desired actuator responses received from the computational agents in their local neighborhood, and (iii) the positional information from at least one sensor unit in its spatially localized region of control, to determine adjustments to at least one actuator unit in its spatially localized region of control to move the object along the transport assembly.

Accordingly, Applicants respectfully submit that amended independent claims 1 and 15 are patentably distinguishable over Konishi whether taken singly or in combination with Harada. Insofar as claims 2-14 and 16-20 are concerned, these claims depend from one of now presumably allowable amended claims 1 or 15 and are also believed to be in allowable condition.

2. Response to Double Patenting Rejection

In response to the double patenting rejection beginning on page 8 of the Office Action, Applicants incorporate the response thereto set forth in section 4 of the Amendment by Applicants' faxed on November 29, 2001.

3. Fee Authorization And Extension Of Time

No additional fee is believed to be required for this Amendment. However, the undersigned Xerox Corporation attorney hereby authorizes the charging of any necessary fees, other than the issue fee, to Xerox Corporation Deposit Account No. 24-0025. This also constitutes a request for any needed extension of time and authorization to charge all fees therefor to Xerox Corporation Deposit Account No. 24-0025.

4. Conclusion

In view of the foregoing remarks, reconsideration of this application and allowance thereof are earnestly solicited. In the event the Examiner considers a personal contact advantageous to the disposition of this case, the Examiner is hereby requested to call Attorney for Applicant(s), Thomas Zell.

Respectfully submitted,

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APPENDIX

Marked Up Amended Claims:

This section of the Appendix sets forth a marked up version of the prior pending claim(s) with additions shown with underlining (e.g., new text) and deletions shown with a strikethrough (e.g., ~~delete text~~) under 37 C.F.R. 1.121(c)(1)(ii).

1. **(Once Amended)** A transport assembly for moving an object, comprising:

sensor units and actuator units arranged on the transport assembly; said sensor units for providing positional information of the object; said actuator units for moving the object relative to the transport assembly;

~~local~~ computational agents coupled said sensor units and said actuator units; each computational agent receiving positional information from at least one sensor unit and computing a desired actuator response for at least one actuator unit in a spatially localized region of control on the transport assembly~~each of said computational agents accumulating sensor information from a spatially localized grouping of sensor units~~; and

a global controller, coupled to said ~~local~~ computational agents, for receiving aggregate operating characteristics from, and delivering global constraints to, said ~~local~~ computational agents;

wherein said computational agents are grouped into a plurality of local neighborhoods; the computational agents in each local neighborhood being: (a) coupled to sensors and actuators that are located physically proximate to each other on

the transport assembly; and (b) communicatively coupled to each other for directly communicating their desired actuator responses to each other; and

wherein each of said ~~local~~ computational agents ~~using~~ use (i) the global constraints delivered by the global controller, (ii) the desired actuator responses received from the computational agents in their local neighborhood, and (iii) the positional information from the at least one sensor unit ~~information~~in its spatially localized region of control, to determine adjustments to ~~said~~ the at least one actuator unit~~s~~ in its spatially localized region of control to move the object along the transport assembly.

2. **(Once Amended)** The transport assembly according to claim 1, further comprising a lookup table for communicating the global constraints to said ~~local~~ computational agents.

3. **(Once Amended)** The transport assembly according to claim 1, further comprising a filter unit for computing the aggregate operating characteristics after receiving the ~~sensor~~ positional information from the ~~local~~ computational units.

4. The transport assembly according to claim 1, wherein said global controller receives the aggregate operating characteristics over a first operating interval.

5. The transport assembly according to claim 4, wherein said global controller delivers the global constraints over a second operating interval.

6. The transport assembly according to claim 5, wherein the second operating interval is longer than the first operating interval.

7. **(Once Amended)** The transport assembly according to claim 1, wherein sizes of ~~neighboring ones of said sensor units and said actuator units are coupled to computational agents that communicate directly with each other~~the local neighborhoods of computational agents is determined adaptively.

8. **(Once Amended)** The transport assembly according to claim 1, wherein sizes of the local neighborhoods of computational agents are fixed~~said actuator units are spatially proximate to each other and ones of said sensor units~~.

9. **(Once Amended)** The transport assembly according to claim 1, wherein said ~~local~~ computational agents compute a global response using the global constraints.

10. **(Once Amended)** The transport assembly according to claim 9, wherein ~~said~~each ~~local~~ computational agent~~s~~ computes ~~a local~~the desired actuator response ~~with~~ using the ~~sensor~~ positional information from the at least one sensor unit in its spatially localized region of control on the transport assembly.

11. **(Once Amended)** The transport assembly according to claim 10, wherein said ~~local~~ computational agents determine whether spatially localized groupings of sensor and actuator units function properly~~adjustments to said actuator units with a desired actuator response computed using the global response and the local response~~.

12. **(Once Amended)** The transport assembly according to claim ~~11~~1, wherein said ~~local~~ computational agents rank the global response and the desired actuator ~~local~~ response in importance using weights.

13. **(Once Amended)** The transport assembly according to claim 12, wherein said ~~local~~ computational agents adaptively determine values for the weights.

14. **(Once Amended)** The transport assembly according to claim 1, wherein said ~~local~~ computational agents and said global controller are organized hierarchically.

15. **(Once Amended)** In a transport assembly having sensors, actuators and a controller, the controller having computational agents and a global controller for controlling movement of an object on the transport assembly, a method for operating each of the computational agents, comprising the steps of:

receiving positional information from at least one sensor in a spatially localized region of control on the transport assembly;

~~(a)~~ computing a ~~local~~ desired actuator response ~~for~~ for~~accumulated sensor information from a spatially localized grouping of sensors~~at least one actuator in its spatially localized region of control on the transport assembly;

~~(b)~~ computing a global actuator response for detected global constraints from the global controller;

receiving desired actuator responses from other computational agents in a local neighborhood of computational agents to which it is grouped; the computational agents grouped in each local neighborhood being coupled to sensors and actuators that are located physically proximate to each other on the transport assembly;

~~(c)~~ computing an ~~desired~~ actuator response ~~for minimizing differences between~~using (i) the computed local actuator response received from computational agents in its local neighborhood of computational agents, (ii) the positional information from the at least one sensor in its spatially localized region of control, and (iii) the computed global actuator response; and

~~(d)~~applying the ~~desired~~ actuator response to the at least one actuator in ~~a~~ its spatially localized ~~grouping~~ region of ~~actuator units~~control on the transport assembly.

16. **(Once Amended)** The method according to claim 15, ~~further comprising the step of modifying the desired actuator response~~wherein the computed actuator response ~~to compensate~~compensates for malfunctioning actuators.

17. **(Once Amended)** The method according to claim 16, wherein the desired actuator response is computed using accumulated positional information from the at least one senor in its spatially localized region of control on the transport assembly ~~said modifying step compares the desired actuator responses of computational agents coupled to spatially localized groupings of sensors and actuators~~.

18. **(Once Amended)** The method according to claim ~~16~~15, wherein the size of the local neighborhoods of computational agents is determined adaptively~~wherein said modifying step compares the local actuator response of computational agents coupled to spatially localized groupings of sensors and actuators~~.

19. **(Once Amended)** The method according to claim 16, further comprising the step of determining whether spatially localized groupings of sensors and actuators ~~units~~ function properly.

20. **(Once Amended)** The method according to claim 16, wherein said step ~~(c)~~of computing a desired actuator response further comprises the step of retrieving the global constraints from a lookup table.